STANDARD OPERATING PROCEDURE

No. 2420.6E

SAMPLE CONTAINER SELECTION, PRESERVATION AND HOLDING TIMES

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By Larry Marchin
ENSV/RLAB/CATS

APPROVED:

Nicole R. Robley — Peer Reviewer — 3/22/06 — Date

[signature] — Laboratory Manager — 23 March 2006 — Date

Harold S. Brown — Independent QA Reviewer — 3/23/06 — Date

Recertified:

Reviewer					
Date					

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Attachments

A. PURPOSE AND APPLICABILITY

The purpose of this Standard Operating Procedure (SOP) is to provide guidance for the selection of the proper sample containers and intermediate sample collection containers or devices when collecting samples for specific constituents (parameters) or groups of constituents; and for determining sample preservation and the holding times of samples from the time of collection until analysis is performed.

The guidance contained herein is applicable to all personnel who collect environmental samples for analysis by the Environmental Services Division (ENSV), including EPA and contractor personnel.

B. DEFINITIONS

ASR	Analytical Services Request
BNA	Base-Neutral/Acid Extractable
BOD	Biochemical Oxygen Demand
CBOD	Carbonaceous Biochemical Oxygen Demand
CFR	Code of Federal Regulations
DBCP	1,2-Dibromo-3-chloropropane
DO	Dissolved Oxygen
EDB	Ethylene Dibromide
ENSV	Environmental Services Division
GFF	Glass Fiber Filter
HEM	Hexane Extractable Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NPDES	National Pollutant Discharge Elimination System
PCB	Polychlorinated Biphenyl
PE	Performance Evaluation
PM	Project Manager
QC	Quality Control
RLAB	Regional Laboratory Branch
RSTC	Regional Science and Technology Center (facility where the RLAB is located)
RSCC	Regional Sample Control Coordinator
SOP	Standard Operating Procedure
SSR	Sampling Supplies and QC/PE Samples Request
SW	Solid Waste
TCLP	Toxicity Characteristic Leachate Procedure
TKN	Total Kjeldahl Nitrogen

TOX	Total Organic Halogens
TPH	Total Petroleum Hydrocarbons

C. SAMPLE CONTAINERS

1. The use of the proper sample container is extremely important to ensure the representativeness of the analytical data obtained, the sufficiency of the sample volume for analysis, and the non-interference or contamination of the sample resulting from the sample container material. When considering the sufficiency of the sample volume for analysis, any matrix spike and matrix spike duplicates (MS/MSD) must be accounted for, and the sampling volume should be adjusted as necessary (One sample for each analyte in each sampling event should at least be double the normal volume or larger volumes for all samples could be used. For example, since water samples for extractables are being collected in 1-gallon bottles, there should be sufficient volume to perform MS/MSD analysis on any sample in the batch.)

2. Special care will be taken to avoid any inadvertent contamination of sample containers prior to or during the sample collection process. Specifically:

   a. Sample containers shall be left sealed or containerized during storage and transport to the sampling location and until the time of actual sample collection. [Exception: Polyethylene cubitainers are received from the manufacturer with the screw caps not attached. The cubitainers are collapsed and nested. The caps are screwed on to the cubitainers after they are filled with sample.]

   b. Sample containers will <u>not</u> be rinsed with the media being sampled during the sample collection process unless specifically required for a given parameter or sampling process (e.g., collecting water samples for toxicity testing).

   Note: The specific SOPs on sample collection should be referred to for the appropriate collection procedure to be used.

3. The sample container selection process is governed by:

   a. The parameter or group of parameters to be analyzed; this includes the desired level of detection in many cases.

   b. The media or matrix to be sampled (i.e., air, solid, tissue, water or other).

c. The analytical method to be used for the analysis.

d. The laboratory (i.e., EPA Region 7 laboratory or a contract laboratory) to perform the analysis. The laboratory where samples will be analyzed is determined by the Laboratory Branch (RLAB) upon receipt of an Analytical Services Request (ASR) form.

4. Attachment 1 provides specific guidance for use in Region 7 in selecting the proper sample container by parameter, or parameter group, and the media being sampled. Additional guidance or requirements for acceptable materials of sample containers are contained, by the parameter to be analyzed, in the current 40 CFR Parts 136 and 141, and SW-846. Also, guidelines are normally found in the specific analytical methods and sampling procedures.

5. When the use of intermediate sample collection containers is necessary, guidance on recommended intermediate container materials may be found in Attachment 2.

D. SAMPLE PRESERVATION

1. The immediate on-site analysis of samples at the time of collection is, in most cases, neither possible nor practical. Therefore, methods have been established to maintain the integrity of the sample until analysis can be accomplished. Even when samples are preserved in an appropriate manner, they should be analyzed as soon as possible after collection. An integral part of preservation is the selection of the proper sample container, the pretreatment of a sample container (if necessary), and the holding time allowable prior to analysis.

2. The purpose of sample preservation is to 1) retard biological action; 2) retard hydrolysis of chemical compounds and complexes; 3) reduce volatility of constituents; and 4) reduce absorption effects. The preservation methods used are generally limited to pH control, chemical addition, refrigeration or freezing. As a rule, the refrigeration (or icing) of samples should be utilized to maintain the samples at a temperature of $4 \pm 2°C$ during sample collection (including the collection of time or flow-weighted composite samples), transport, and storage.

3. The current guidance for sample preservation for use in Region 7 is provided in Attachment 1. Although taken into consideration when preparing this guidance, additional specific guidelines and requirements for sample preservation may be found in regulations (e.g., 40 CFR Part 136), publications (e.g., SW-846) and applicable analytical methods.

4. The following guidance is provided for field personnel to use when preserving the types of samples indicated:

   a. Grab Samples: The applicable preservation method must be accomplished immediately upon sample collection.

   b. Manually Composited Water Samples: The applicable preservation must be added, in full, to the initial aliquot and thus be available for each subsequent aliquot.

   c. Automatically Composited Water Samples:

      (1) When collected for either a single parameter or a parameter group where the type and amount of preservative required are identical, the applicable preservative is added to each container receiving an aliquot, prior to compositing.

      (2) When collecting a composite sample that will later be split to create samples for a variety of individual parameters and each of these parameters requires different preservation methods, the samples collected for the composite should be iced to maintain a temperature of 4°C until the compositing and splitting can be completed. The appropriate preservative is then added at the time the composite is split into separate containers.

5. Samples of the following media will <u>not</u> be preserved with the addition of any chemical compound, but will be chilled to 4°C after collection and during transport and storage.

   a. Solids: soil, sediment, sludge

   b. Tissue (or freeze, -15 to -20°C)

   c. Other: non-aqueous solutions, product samples (liquid or solid), drum samples, wipe samples

6. The following parameters require special procedures:

   a. **Biochemical Oxygen Demand (BOD)/Carbonaceous Biochemical Oxygen Demand (CBOD)**. Water samples of chlorinated effluents collected for analysis of this parameter must be labeled with the word "CHLORINATED" on the sample tag to alert laboratory personnel.

Chlorinated samples require different analytical procedures than unchlorinated samples for this parameter.

b. **Cyanide, Total and Amenable to Chlorination**. Water samples for these parameters should not be collected using automatic samplers, but should be collected manually either as a grab or a composite of several grab samples which are preserved at the time of collection. Since oxidizing agents such as chlorine decompose many cyanides, the sample must be treated to eliminate such agents, if they are present, at the time of collection. The presence of chlorine is determined by testing a drop of the sample with potassium iodide (KI)-starch test paper. A change in the color of the paper to blue indicates the need for treating the sample with a dechlorinization agent. This treatment is accomplished by adding ascorbic acid, a few crystals at a time followed by the subsequent testing of a drop of sample until no color is produced on the KI indicator paper. An additional 0.6 gram of ascorbic acid is then added for each liter of sample volume. Preservation of the sample is then accomplished by adding 2 mL of 10 N sodium hydroxide solution or 10 pellets of sodium hydroxide crystals per liter of sample (to pH $\geq$ 12) and by icing the sample to 4°C during transport and storage.

c. **Dissolved Oxygen (DO)**. Water samples for this parameter are collected only on a grab basis. When collecting a sample for this parameter, the sample bottle should be filled to overflowing to ensure that no air bubbles are entrapped in the bottle when the stopper is replaced. When immediate measurement is not possible on site utilizing the DO probe method, the sample will be "fixed" immediately upon collection by first adding 2 ml of manganous sulfate ($MnSO_4$) solution and then 2 ml of alkali-iodide-azide solution well below the surface of the liquid. The sample is mixed by inverting the bottle several times while holding the stopper in place and allowing to set until the floc has settled half way. Carefully remove the stopper and immediately add 2 ml of concentrated sulfuric acid (H_2SO_4) by allowing the acid to run down the neck of the bottle. Re-stopper and mix again and store at 10-20°C out of direct sunlight. Completion of the analysis for DO utilizing the Winkler titration method (Azide Modification) should be accomplished as soon as possible after collection and fixing, but not more than 8 hours after collection.

d. **Metals, Dissolved**. Water samples for this parameter must be filtered on site utilizing a 0.45μm membrane filter as soon as practical after collection and then acidified with 5 mL 1:1 HNO_3 per liter of sample.

e. **Microbiology (Total and Fecal Coliform; Fecal Streptococci).** Water samples for these parameters will be collected only on a grab basis. For chlorinated effluents, sodium thiosulfate (0.008% $Na_2S_2O_3$) is added to the sample. This dechlorinating agent is normally added during sample container preparation and is, therefore, normally present in the sample container. Care must be taken during sample collection to avoid overfilling or rinsing out the agent. In addition, care must be taken to avoid contamination of the sterile sample container prior to or during sample collection; i.e., leave cap on container until ready to collect sample and do not place fingers in container or on the inside of the cap, while collecting a sample. An air space should be left at the top of the container after the sample is collected. Ice to 4°C.

f. **Oil and Grease (Hexane Extractable Material, HEM)** Water samples for this parameter will be collected in one liter glass bottles on a grab basis only and acidified with 1:1 HCl to pH < 2 immediately after collection. The sample container should never be rinsed with the water or wastewater because these constituents tend to adhere to the sides of the container. Care should be taken to avoid contamination of the sample from fingers placed in the container or on the inside liner of the cap. In addition, enough air space should be allowed in the container to allow for the addition of the preservative.

g. **Organics, Volatiles.** Grab samples only are collected for these parameters. Each sample will consist of two (2) 40-mL vials. Generally, four (4) 40-mL vials per water sample will be collected for low detection level and drinking water samples.

(1) Drinking water samples containing residual chlorine must be treated with sodium thiosulfate or ascorbic acid (depending on the analytical method) at the time of collection.

(2) Wastewater samples containing residual chlorine must be treated with ascorbic acid (25 mg per 40 mL) at the time of collection. These dechlorinating agents must be placed in the vials prior to collecting the samples.

(3) When collecting water samples, fill the sample bottles to overflowing, but take care not to flush out the sodium thiosulfate or ascorbic acid, if present. No air bubbles should pass through the sample as the bottle is filled, or be trapped in the sample when the bottle is sealed. After collection, the pH of the sample is adjusted

to a pH < 2 by carefully adding one drop of 1:1 HCl for each 20 mL of sample volume. Seal the sample bottles teflon-face down, and shake vigorously for 1 minute. A proper seal can be checked by inverting the sample and lightly tapping the end on a solid surface. If air bubbles are present, open the vial, add additional sample, reseal, and recheck for air bubbles. Store samples out of direct sunlight.

h. **Phenols (Phenolics).** Water samples for this parameter should not be collected by using automatic samplers, but should be collected as a grab or a manual composite of grabs and preserved with 2 mL H_2SO_4 to a pH < 2 at the time of collection. The samples should be iced to maintain them at 4°C during transport and storage.

E. SAMPLE HOLDING TIMES

1. The issue of holding times for samples is critical in the sample collection and analysis process, because the integrity of the samples can be affected depending on the parameter to be analyzed. Sample holding times are defined as the period of time between sample collection and initiation of sample analysis. In the case of timed composite samples, the holding time starts at the end of the compositing period (i.e., at the time the last portion of the composite sample is obtained).

2. Since holding times can affect the validity of the reported analytical results (especially in certain media programs and in enforcement actions), everyone involved in planning and executing sampling activities; planning and performing analyses; and reviewing analytical results must be cognizant of the implications of exceeding them during the process. In many instances, the holding times are required by specific regulations (e.g., 40 CFR Part 136 for wastewater samples under the NPDES program), while many others are recommended. Also, see Footnote 8 of Attachment 1.

3. Although many of the holding times contained in Attachment 1 were derived from regulatory requirements, the holding times should be considered as guidelines. When making decisions on the validity of analytical results based on holding times, personnel should consult appropriate regulations to determine if there are specific requirements for sample holding times.

F. OBTAINING SAMPLING SUPPLIES

1. When sampling supplies (e.g., sample containers, sample collection devices, preservatives, etc.) are needed, the project manager for the specific sampling

activity requests the necessary supplies on the Sampling Supplies and QC/PE Samples Request (SSR).

2. The requestor can pick up the supplies at the ENSV warehouse facility (3150 Dodge). The preservatives must be picked up at the RSTC (300 Minnesota Avenue). It is recommended that the requestor contact the Regional Sample Control Coordinator (RSCC) or designated back-up at the RLAB before going to either facility to ensure the supplies are ready for issuance.

G. REFERENCES

1. Code of Federal Regulations, Title 40 (40 CFR), Part 136.

2. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), U.S. EPA.

3. Standard Methods for the Examination of Water and Wastewater, Joint Editorial Board, American Public Health Association, American Water Works Association and Water Environment Federation, Latest Edition.

Attachment 1

Guide for Sample Container Selection, Preservation and Holding Times

Parameter[1]	Sample Container[2]	Preservation	Holding Time[3]
I. **Air and Gaseous**			
Dioxins/Furans	Puff glass jar	Cool 4°C	365 days
Metals on High-Vol GFF	1-gal. resealable plastic bag	Ambient Temperature	
Ozone Precursors			
Ambient levels	6-L canister	None	60 days
Source levels	400 mL canister	None	60 days
Particulate Matter on High-Vol GFF	1-gal. resealable plastic bag	Ambient Temperature	
Pesticides/PCBs	Puff glass jar	Cool 4°C	7 days
Semivolatiles/BNA	Puff/XAD glass jar	Cool 4°C	14 days
Volatile Organics			
Ambient levels	6-L canister	None	60 days
Source levels	400 mL canister	None	60 days
GC/MS Scan	6-L canister	None	30 days
II. **Soil, Sediment and Solids**			
A. Non-Product Samples			
Asbestos	Plastic jar	None	None
Cyanide	8-oz. glass jar	Cool 4°C	28 days
Dioxin/Furans	8-oz. glass jar/sealable plastic bag in 1-qt. paint can	Cool 4°C	365 days
Explosives	8-oz. glass jar	Cool 4°C	14 days
Flashpoint	8-oz. glass jar	Cool 4°C	
GC/MS Scan, SemiVOA	8-oz. glass jar	Cool 4°C, store in dark	14 days
GC/MS Scan, VOA	2, 40mL VOA vials	Cool 4°C	14 days
Herbicides	8-oz. glass jar	Cool 4°C	14 days
Metals			
All metals except Cr^{+6} and Hg, collected separately	8-oz. glass jar	Cool 4°C	180 days
Mercury	8-oz. glass jar	Cool 4°C	180 days
Cr^{+6}	8-oz. glass jar	Cool 4°C	30 days
Methanol	8-oz. glass jar	Cool 4°C	14 days
Nutrients			
Nitrogen (NH_3, NO_2, TKN)	8-oz. glass jar	Cool 4°C	28 days
Phosphorous, total	8-oz. glass jar	Cool 4°C	
Oil and Grease	8-oz. glass jar	Cool 4°C	
pH	8-oz. glass jar	Cool 4°C	None
Phenolics (colorimetric)	8-oz. glass jar	Cool 4°C	28 days
Perchlorate	8-oz. glass jar	Cool 4°C	28 days
Pesticides/PCBs	8-oz. glass jar	Cool 4°C	14 days
Radioactivity	8-oz. glass jar	Cool 4°C	180 days

Parameter	Sample Container	Preservative	Holding Time
II. Soil, Sediment, and Solids (cont.)			
A. Non-Product Samples (cont.)			
Semivolatiles/BNA	8-oz. glass jar	Cool 4°C	14 days
Sulfate/Sulfide	8-oz. glass jar	Cool 4°C	28 days
Soil Toxicity Test	1-gal. ziplock bag	Cool 4°C	56 days
Total Organic Carbon	8-oz. glass jar	Cool 4°C	28 days
Total Petroleum Hydrocarbons (TPH)			
SemiVOA	8-oz. glass jar	Cool 4°C	14 days
VOA	2, 40-mL glass vials	Cool 4°C	14 days
Total Kjeldahl Nitrogen	8-oz. glass jar	Cool 4°C	None
Organic Parameters			
All except volatile organics	8-oz. glass jar	Cool 4°C	14 days
Volatile organics[3]	2, 40-mL glass vials	Cool 4°C or MeOH & Cool 4°C or $NaHSO_4$ & Cool 4°C	14 days
TCLP			
Metals, except Hg	8-oz. glass jar	Cool 4°C	180 days to extract, 180 days after extraction (required)
Mercury	8-oz. glass jar	Cool 4°C	28 days to extract, 28 days after extraction (required)
Volatile organics	2, 40-mL glass vials	Cool 4°C	14 days to extract, 14 days after extraction (required)
Semivolatile organics	8-oz. glass jar	Cool 4°C	14 days to extract, 7 days to extraction, 40 days after extraction (required)
Pesticides/Herbicides	8-oz. glass jar	Cool 4°C	14 days
B. Product Samples			
All parameters	8-oz. glass jar/sealable plastic bag in paint can	Cool 4°C	
III. Tissue			
Fish, collected for whole body/edible portion, all parameters	Double wrapped in heavy duty foil	Freeze	
Resectioned tissue, collected for:			
Metals	Double wrapped in heavy duty foil	Freeze	180 days
Semivolatiles	Double wrapped in heavy duty foil	Freeze	
Volatiles	Double wrapped in heavy duty foil	Freeze	
Foliage			
Herbicides/Pesticides	Double wrapped in heavy duty aluminum foil	Freeze	
Macroinvertibrates[6]		70% ethanol	6 months
Periphyton[6]			
Chlorophyll A		Freeze, store in dark	30 days
Enumeration		5% formalin, Cool 4°C, store in dark	6 months
Dioxins/Furans	Double wrapped in heavy duty foil	Freeze	365 days
Phytoplankton, collected for[6]			
Chlorophyll A		Cool 4°C, store in dark	14 days
Enumeration		5% formalin	6 months

Parameter	Sample Container	Preservative	Holding Time
IV. Aqueous Samples			
Chlorine Dioxide	1-L plastic cubitainer	Cool 4°C	None
Chlorophyll A	4-L plastic cubitainer	Cool 4°C, store in dark	14 days
Coliform, fecal	300-mL sterile plastic bottle	Cool 4°C, 0.008% $Na_2S_2O_3$	6 hours
Dioxins/Furans	1-L amber glass bottle	Cool 4°C	365 days
Dissolved Organic Carbon	1-L amber glass bottle	H_2SO_4 to pH<2 Cool 4°C	28 days
Explosives	128-oz. amber glass bottle	Cool 4°C	7 days to extract, 40 days after extraction
Herbicides	128-oz. amber glass bottle	Cool 4°C	7 days to extract, 40 days after extraction
Flashpoint	8-oz. glass jar	Cool 4°C	
Metals (except Hg and Cr^{+6})			
Total and acid soluble	1-L plastic cubitainer	HNO_3 to pH<2	6 months
Dissolved	1-L plastic cubitainer	Filter HNO_3 to pH<2	6 months
Chromium, hexavalent	1-L plastic cubitainer	Cool 4°C	24 hours
Mercury	1-L plastic cubitainer	HNO_3 to pH<2	28 days
Strontium	1-L plastic cubitainer	HNO_3 to pH<2	6 months
Acid, %	1-L plastic cubitainer	Cool 4°C	None
Alkalinity	1-L plastic cubitainer	Cool 4°C	14 days
BOD/CBOD	1-L plastic cubitainer	Cool 4°C	48 hours
COD	1-L plastic cubitainer	H_2SO_4 to pH<2 Cool 4°C	28 days
Chlorine (residual)	1-L plastic cubitainer	Cool 4°C	1 day
Conductivity	1-L plastic cubitainer	Cool 4°C	28 days
Cyanide (total and amenable To chlorine)	1-L plastic cubitainer	(Ascorbic acid), NaOH to pH>12, Cool 4°C	14 days
Halides (Br^-, Cl^-, F^-)	1-L plastic cubitainer	Cool 4°C	28 days
Haloacetic Acids/Dalapon	1-L amber glass bottle	Ammonium Chloride, Cool 4°C	14 days
Hardness	1-L plastic cubitainer	HNO_3 to pH<2, Cool 4°C	6 months
Inorganic Anions	1-L plastic cubitainer	EDA, Cool 4°C	14 days
Methane, Ethane, Ethene	2, 40-mL VOA vials	Cool 4°C	7 days
Methanol	1-L amber glass bottle	Cool 4°C	7 days
Nonfilterable Solids (NFS)	1-L plastic cubitainer	Cool 4°C	7 days
Oxygen, Dissolved (Winkler)	300-mL glass BOD bottle with Attached ground glass stopper	$MnSO_4$ + Alkali-Iodide-Azide, H_2SO_4	8 hours
Dissolved Oxygen, probe Method	1-L plastic cubitainer	Cool 4°C	1 day

Parameter	Sample Container	Preservative	Holding Time
IV. Aqueous Samples (cont.)			
pH	1-L plastic cubitainer	Cool 4°C	determine immediately
Perchlorate	1-L plastic cubitainer	Cool 4°C	28 days
Residue			
All but settleable	1-L plastic cubitainer	Cool 4°C	7 days
Settleable	1-L plastic cubitainer	Cool 4°C	48 hours
Sulfate	1-L plastic cubitainer	Cool 4°C	28 days
Sulfide	1-L plastic cubitainer	Zinc acetate + NaOH to pH>9, Cool 4°C	7 days
Total Dissolved Solids (TDS)	1-L plastic cubitainer	Cool 4°C	7 days
Total Kjeldahl Nitrogen	1-L plastic cubitainer	H_2SO_4 to pH<2.5, Cool 4°C	28 days
Total Solids	1-L plastic cubitainer	Cool 4°C	7 days
Turbidity	1-L plastic cubitainer	Cool 4°C	48 hours
Nutrients			
Nitrogen-Ammonia	1-L plastic cubitainer	H_2SO_4 to pH<2 , Cool 4°C	28 days
Nitrogen-Organic	1-L plastic cubitainer	H_2SO_4 to pH<2, Cool 4°C	28 days
Nitrate	1-L plastic cubitainer	Cool 4°C	48 hours
Nitrate-Nitrite	1-L plastic cubitainer	H_2SO_4 to pH<2, Cool 4°C	28 days
Nitrite	1-L plastic cubitainer	Cool 4°C	48 hours
Phosphorous (total)	1-L plastic cubitainer	H_2SO_4 to pH<2.5, Cool 4°C	28 days
Ortho-phosphate	4-oz. plastic bottle	Filter, Cool 4°C	48 hours
Phosphorous, (dissolved)	1-L plastic cubitainer	Filter, H_2SO_4 to pH<2, Cool 4°C	28 days
Carbamates[10]	60-mL screw cap vial	1.8 mL monochloroacetic acid buffer pH<3, Cool 4°C	14 days
Oil and Grease (HEM)	1-L glass jar	1:1 HCL to pH<2, Cool 4°C	28 days
Pesticides/PCBs	128-oz. amber glass bottle	Cool 4°C	7 days to extract, 40 days after extraction[9]
Phenolics	1-L glass jar	H_2SO_4 to pH<2, Cool 4°C	28 days
Radionuclides	1-L plastic cubitainer	HNO_3 to pH<2	6 months (water:alpha/beta) 5 days(gamma; DW:alpha/beta)
Semivolatile/BNA	128-oz. amber glass bottle	Cool 4°C, store in dark	7 days to extract, 40 days after extraction
GC/MS Scan (BNA)	128-oz. amber glass bottle	Cool 4°C, store in dark	7 days
Total Organic Carbon (TOC)	1-L amber glass bottle	H_2SO_4 to pH<2, Cool 4°C	28 days
Total Organic Halogens (TOX)	8-oz. amber glass bottle	Cool 4°C	7 days

Parameter	Sample Container	Preservative	Holding Time
IV. Aqueous Samples (cont.)			
Total Petroleum Hydrocarbons (TPH)			
SemiVOA	128-oz. amber glass bottle	Cool 4°C	7 days
VOA	2, 40-mL VOA vials	Cool 4°C	14 days
Toxicity Tests			
Acute	10-L (2.5-gal) plastic cubitainer	Cool 4°C	36 hours
Bioscreen (24 or 48 hr.)	4-L (1-gal.) plastic cubitainer or glass bottle	Cool 4°C	24 hours
Chronic	20-L (2.5/5-gal.) plastic cubitainer	Cool 4°C	36 hours
Triazine Herbicides	128-oz. amber glass bottle	Cool 4°C	14 days
Tritium	8-oz. glass jar	None	5 days
Volatile Organics[3, 5]			
Purgeable halocarbons	2, 40-mL glass vials	HCl to pH<2, Cool 4°C	14 days
Purgeable aromatic hydrocarbons	128-oz. amber glass bottle	HCl to pH<2, Cool 4°C	7 days
Routine Detection Level	2, 40-mL glass vials	HCl to pH<2, Cool 4°C	14 days
Low Detection Level	4, 40-mL glass vials	HCl to pH<2, Cool 4°C	14 days
EDB/DBCP	2, 40-mL glass vials	Sodium Thiosulfate Cool 4°C	14 days
GC/MS Scan (VOA)	2, 40-mL VOA vials	HCl to pH<2, Cool 4°C	14 days
V. Liquid, Non-Aqueous			
TCLP (> 5% solids)[4]			
Mercury	8-oz. glass jar	Cool 4°C	28 days to TCLP extract, 28 days after extraction
Metals, except Hg	8-oz. glass bottle	Cool 4°C	180 days
Volatile Organics	2, 40-mL glass vials	Cool 4°C	14 days to TCLP extract, 14 days after extraction
Semivolatile Organics	8-oz. glass jar	Cool 4°C	14 days to TCLP extract, 7 days to extraction, 40 days after extraction
Pesticides/Herbicides	128-oz. amber glass bottle	Cool 4°C	7 days
Organic Parameters			
All except volatile organics	8-oz glass jar	Cool 4°C	7 days to extract, 40 days after extraction
Volatile organics	8-oz glass jar	Cool 4°C	14 days
VI. Wipe Samples[7]			
Arsenic	8-oz. glass jar	Cool 4°C	
Cyanide	8-oz. glass jar	Cool 4°C	
Dioxin	8-oz. glass jar	Cool 4°C	365 days
Herbicides/Pesticides	8-oz. glass jar	Cool 4°C	14 days
Metals	8-oz. glass jar	Cool 4°C	180 days
Picric Acid	8-oz. glass jar	Cool 4°C	
Organic other parameters			
All except volatile organics	8-oz. glass jar	Cool 4°C	7 days to extract, 40 days after extraction
Volatile organics	8-oz. glass jar	Cool 4°C	

Parameter	Sample Container	Preservative	Holding Time
VI. Wipe Samples (cont.)			
TCLP (> 0.5% solids) Metals, except mercury	8-oz. glass jar	Cool 4°C	180 days to TCLP extract, 180 days after extraction

[1] Non-product and product sample definitions: A non-product sample is a sample which consists primarily of naturally occurring materials that may contain mechanically or chemically manufactured materials or substances as contaminants. A product sample is a sample which is known to consist primarily of a mechanically or chemically manufactured material that does not otherwise occur naturally in the immediate environment being sampled. A sample which cannot be identified as a non-product sample should be considered a product sample

[2] All glass containers require a Teflon-lined lid or cap.

[3] These parameters are always collected as replicates. The sample container consists of two or four 40-mL glass vials (VOA vials) and an activated carbon filled thimble contained in a 1-L plastic cubitainer.

[4] § 40 CFR Part 261 Appendix II, 2.1: For liquid wastes (i.e., those containing less than 0.5% dry solid material), the waste, after filtration through a 0.6 to 0.8 μm glass fiber filter, is defined as the TCLP extract.

[5] Sodium Thiosulfate ($Na_2S_2O_3$) or Ascorbic Acid ($C_6H_8O_6$) is utilized to de-chlorinate samples of chlorinated water or wastewater prior to pH adjustment. For drinking water samples, consult the applicable method to determine appropriate dechlorinating agent.

[6] Sample containers, preservation, and holding times vary. The information provided is Regional guidance. For compliance samples, consult appropriate references for complete preservation requirements.

[7] Each jar should contain a medical gauze pad.

[8] Generally, there are no required holding limits for air, soil, product and wipe media. (Exceptions: see Chapter 4 of SW-846). However, it is recommended that samples be analyzed within the holding time limits established in aqueous media for the specific analytes or analyte groups.

[9]Method 505 holding time 14 days (7 days for Heptachlor), preserve with Sodium Thiosulfate, 4° C, container 40-mL vial.

[10]Method 531.1 samples must be preserved to a pH<3 using monochloroacetic acid to minimize degradation of oxamyl, 3-hydroxycarbofuran, aldicarb sulfoxide, and carbaryl in neutral and basic waters. If residual chlorine is present add 80 mg of sodium thiosulfate per liter of sample to the sample bottle prior to collecting the sample.

Attachment 2

Guide for Selecting Intermediate Sample Container Material

Media Sampled/Parameter	Intermediate Sample Container Material
I. Soil, Sediment and Solids	
A. Non-Product and Product Samples	
All parameters except volatile organics	Glass, Aluminum
Volatile Organics[1]	Glass, Stainless Steel, Aluminum
II. Tissue	
A. Fish	
All parameters	Glass, Plastic
III. Liquids	
A. Aqueous Samples	
Chlorophyll A	Artificial substrate (glass slide)
Coliform, fecal[2]	Glass or Plastic
Dioxin/Furans	Glass, Stainless Steel (solvent rinsed)
Explosives	Glass
Metals:	
All except Cr^{+6}	Glass, Plastic, Automatic sampler equipped with Tygon intake tubing and glass or plastic compositing container.
Chromium, hexavalent	Glass, Plastic
Minerals and Dissolved Materials:	
Acid (%), Alkalinity, BOD, Chloride, Conductivity, Hardness, Residue, Sulfate, Turbidity	Glass, Plastic, Stainless steel, Automatic sampler equipped with Tygon (or Teflon) intake tubing, and glass or plastic compositing container
Chlorine	Glass, Plastic, Stainless steel
COD	Glass, Plastic, Stainless steel, Automatic sampler equipped with Tygon (or Teflon) intake tubing, and glass or plastic compositing container
Cyanide	Glass, Plastic, Stainless steel

Media Sampled/Parameter	Intermediate Sample Container Material
III. Liquids (cont.)	
A. Aqueous Samples (cont.)	
Fluoride	Plastic, Automatic sampler equipped with Tygon (or Teflon) intake tubing, and plastic compositing container
Oxygen, dissolved	Glass, Plastic, Stainless steel
pH, lab or field	Glass, Plastic, Stainless steel, Teflon
Sulfide	Glass, Plastic, Stainless steel
Nutrients (N & P)	Glass, Plastic, Stainless steel, Automatic sampler equipped with Tygon (or Teflon) intake tubing, and glass or plastic compositing container
Oil and Grease[2]	Glass
Pesticides/PCBs	Glass, Stainless steel, Automatic sampler equipped with Teflon intake tubing and glass compositing container (cleaned and solvent rinsed)
Phenols/Phenolics	Glass, Plastic, Stainless steel
Radionuclides	Glass, Plastic
Semivolatiles/BNA	Glass, Stainless steel, Automatic sampler equipped with Teflon intake tubing and glass compositing container (cleaned and solvent rinsed)
Total Organic Carbon	Automatic sampler equipped with Tygon (or Teflon) intake tubing, and glass or plastic compositing container
Total Organic Halogens	Glass, Plastic
Toxicity Tests: Acute Bioscreen Chronic	Automatic sampler equipped with Teflon or new Tygon tubing, and glass or Nalgene compositing container (see SOP No. 2334.6 for tubing and container cleaning)
Volatile Organics[1]	Glass, Stainless steel (not solvent rinsed)
B. Non-Aqueous Product Samples	
All parameters	Glass

[1]An intermediate sample collection device is not recommended for this parameter, but, if one is necessary, care must be taken to insure that the device has not been solvent rinsed.

[2]An intermediate container is not recommended for this parameter; therefore, every effort must be made to collect the sample directly into the sample container.